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| AIR LIQUIDE Intellectual Property 2700 POST OAK BOULEVARD, SUITE 1800 HOUSTON, TX 77056 | | | EXAMINER VDAYAKUMAR, KALLAMBELLA M | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/562,521

Applicant(s)

CHARTIER ET AL.

Examiner

KALLAMBELLA VIJAYAKUMAR

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-52 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 27-38, 40-49, 51 and 52 is/are rejected.
- 7) ☒ Claim(s) 39 and 50 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/S508)
Paper No(s)/Mail Date 12/28/2005
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

- This is a 371 of PCT/FR2004/001798 filed 08 July 2004; and claims priority over FR 0350324 filed 11 July 2003. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.
- The preliminary amendment filed 12/28/2005 has been entered. Claims 27-52 are currently pending with the application.
- The examiner has considered the IDS filed 12/28/2005.

Claim Objections

1. Claim 39 is objected to because of the following informalities: Claim-39 depends upon the cancelled claim-12.
2. Claim 50 is objected to because of the following informalities: Claim-50 depends upon the cancelled claims -20-23.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 46-47 and 51-52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
 - a) Claim 46 recites the limitation "the binder" in Line-4. There is insufficient antecedent basis for this limitation in the claim.
 - b) Claim 47 recites the limitation "the binder" in Line-3. There is insufficient antecedent basis for this limitation in the claim.

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- c) Claims 51-52 provides for the use of the material, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.
- d) Claims 51-52 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 102

Claim Rejections - 35 USC § 103

- The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

- The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

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3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 27-30, 33-38, 40-41, 43, 46-47 and 49 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mazanec et al (US 5,648,304).

Mazanec et al teach the composition of a mixed conductor membrane with the formulae:

- a). $[\text{Sr}_{0.95-x}\text{La}_{0.05}\text{Ca}_x][\text{Co}_{1-y-z}\text{Fe}_y\text{Ni}_z]\text{O}_{3-\delta}$;
- b). $[\text{Sr}_{0.95-x}\text{La}_{0.05}\text{Ca}_x][\text{Co}_{1-y-z}\text{Mn}_y\text{Ni}_z]\text{O}_{3-\delta}$;
- c). $[\text{Sr}_{0.95-x}\text{La}_{0.05}\text{Ca}_x][\text{Co}_{1-y-z}\text{Fe}_y\text{Cu}_z]\text{O}_{3-\delta}$;
- d). $[\text{Sr}_{0.95-x}\text{La}_{0.05}\text{Ca}_x][\text{Co}_{1-y-z}\text{Mn}_y\text{Cu}_z]\text{O}_{3-\delta}$;

and mixtures of the same, where $0.001 < x' < 0.01$, $0.0025 < y < 0.01$ and $0.001 < z < 0.05$, and δ is determined by the valence of the metals that meets the limitation of compositions in instant claims <Abstract; Cl-4, Ln 10-39; Cl-6, Ln 27-35); and "[W]hen, as by a recitation of ranges or otherwise, a claim covers several compositions, the claim is anticipated' if one of them is in the prior art." Titanium Metals Corp. v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (citing In re Petering, 301 F.2d 676, 682, 133 USPQ 275, 280 (CCPA 1962)). The A-elements included Ca, Ba, Sr and mixtures thereof selected from a small genus of elements including Ba (Cl-4, Ln 62-67). The B-elements included Fe, Mn, Cr, V, Ti and mixtures thereof selected from a small genus of elements including Ti (Cl-5, Ln 4-5). The mixed valence state of Element-B in the instant claim-1, Formula-1 is anticipated over the substitution of Sr^{2+} by La^{3+} at A-site of the perovskite and the electroneutrality of the oxide.

With regard to the process claims, the prior art teaches forming the composite oxide by heat treating precursors in air, blending with PVB, pressing into a disc and heat treating the composition (Cl-8, Ln 8-41). All the limitations of the instant claims are met.

The reference is anticipatory.

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In the alternative that the disclosure by Mazanec et al be insufficient to anticipate the instant claims, the instant claimed mixed-conducting perovskite and the method steps for making the perovskite nonetheless would have been obvious to a person of ordinary skilled in the art over the disclosure because the reference teaches each of the claimed ingredients within the composition, structure and a method of making it. The burden is upon the applicant to prove otherwise. In re Fitzgerald, 619 F.2d 67, 205 USPQ594 (CCPA 1980).

2. Claims 27-38, 40-44, 46, 49 and 51-52 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Lee et al (J. Korean Cer Soc, 2003, 40(6), 594-600).

Lee et al teach an oxygen permeable mixed-ion conducting membrane and syn-gas production comprising the formula $\text{La}_{0.7}\text{Sr}_{0.3}\text{Ga}_{0.6}\text{Fe}_{0.4}\text{O}_{3-d}$ (Title, Abstract; Pg-595, Section-2; Fig-1-2, Fig-7). The mixed valence state of Element-B in the instant claim-1, Formula-1 and claim-42 is anticipated over the substitution of Sr^{2+} by La^{3+} at A-site of the perovskite and the electroneutrality of the oxide. The occupation of Ga in a portion of A-site of the perovskite is anticipated over cation distribution and ionic sizes of elements.

The prior art further teaches forming the composite oxide by heating a precursor comprising oxide/carbonates of the metals and sintering at 1250C. The mixing and heat treating of the components in air per claim 49 is anticipated over the stable oxide/carbonate precursor mixture forming an oxide, and that further meets the carrying out step a under controlled oxygen partial pressure in claim-46. All the limitations of the instant claims are met.

The reference is anticipatory.

In the alternative that the disclosure by Lee et al be insufficient to anticipate the instant claims, the instant claimed composition and the method steps nonetheless would have been obvious to a person of ordinary skilled in the art over the disclosure because the reference teaches each of the claimed ingredients within the composition and a method of making it, The burden is upon the applicant to prove otherwise. In re Fitzgerald, 619 F.2d 67, 205 USPQ594 (CCPA 1980).

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3. Claims 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (J. Korean Cer. Soc, 2003, 40(6), 594-600) in view of Mazanec et al (US 5,648,304).

The composition, method of making the composition, and its performance in O₂ transport and syn-gas making by Lee as set for in rejection-2 is herein incorporated.

The prior art fails teach using a binder with LSGF and sintering it a low oxygen pressure per the claims. However, the prior art teaches making a sintered compact of LSCO by dispersing in ethylcellulose and alpha-terpineol, and sintering between 800-1250C ((Pg-595, Sec-2).

It would have been obvious to a person of ordinary skilled in the art to form the LSGF sinter using the ethylcellulose binder similar to the formation of LSCO to benefit from improved cohesiveness of the sintered body of LSGM because it is a perovskite similar to LSCO forming a layer, and it was well known in the art to add a binder in forming membranes at the time of the disclosure of the invention by the applicants as evidenced by Mazanec et al (Cl-8, Ln 17-34), and the debinding binder at low oxygen pressure would be obvious over combustible nature of the organic material.

4. Claims 27-38, 40-44, 46, 49 and 51-52 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tantayanon et al (Separation and Purification Tech., 2003, pp 319-326).

Tantayanon et al teach an oxygen permeable mixed-ion conducting membrane with the formula $\text{La}_{0.6}\text{Sr}_{0.4}\text{Ga}_{1-y}\text{Fe}_y\text{O}_{3-\delta}$ ($y=0.4, 0.6, 0.8$) and its use in forming syn-gas (Title, Abstract; Pg-320-321; Section-2.1; Pg-325, Sec: 3.4). The mixed valence state of Element-B in the instant claim-1, Formula-1 and claim-42 is anticipated over the substitution of Sr^{2+} by La^{3+} at A-site of the perovskite and the electroneutrality of the oxide. The occupation of Ga in a portion of A-site of the perovskite is anticipated over cation distribution and ionic sizes of elements.

The prior art further teaches forming the composite oxide by heating a nitrate precursor mixture with citric acid and sintering between 800-1380C. The mixing and heat treating of the components in air per claim 49 is anticipated over the stable oxide formation from its precursors and that further meets the

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carrying out step a under controlled oxygen partial pressure in claim-46. All the limitations of the instant claims are met.

The reference is anticipatory.

In the alternative that the disclosure by Tantayanon et al be insufficient to anticipate the instant claims, the instant claimed composition and the method steps nonetheless would have been obvious to a person of ordinary skilled in the art over the disclosure because the reference teaches each of the claimed ingredients within the composition and a method of making it, The burden is upon the applicant to prove otherwise. In re Fitzgerald, 619 F.2d 67, 205 USPQ594 (CCPA 1980).

5. Claim 45 is rejected under 35 U.S.C. 103(a) as obvious over Tantayanon et al (Separation and Purification Tech., 2003, pp 319-326).

The composition, method of making the composition, and its performance in O2 transport by Tantayanon as set for in rejection-4 is herein incorporated.

The prior art fails to teach the composite with the instant claimed elemental ratios..

It would have been obvious to a person of ordinary skilled in the art to make instant claimed composite with predictable results and reasonable expectation of success, because prior art teaches the composition with $y=0.2$, and further discloses that the compositions containing $y=0.05-0.2$ were stable membranes under reducing atmospheres (Pg-320, Cl-1, Ln 1-5).

6. Claims 51-52 are rejected under 35 U.S.C. 103(a) as obvious over Tantayanon et al (Separation and Purification Tech., 2003, pp 319-326).

The composition, method of making the composition, and its performance in O2 transport by Tantayanon as set for in rejection-4 is herein incorporated.

The prior art fails to teach the composite being used in the separation of oxygen from air and in making syn-gas from natural gas.

It would have been obvious to a person of ordinary skilled in the art to make use of the composite oxide film in the separation of oxygen and in making syn-gas with predictable results and reasonable

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expectation of success, because it is suggestive of its use in methane oxidation to syn-gas (Pg-319, Cl-2, Pg 319, Cl-2, Last 5-Lines; Pg 326, Fig-6).

7. Claims 27-38, 40-44, 46, 49 and 51-52 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ishihara et al (JP 2001-093325).

Ishihara et al teach an oxygen permeable mixed-ion conducting membrane with the formula $\text{La}_{1-x}\text{MxGa}_{1-y}\text{FeyO}_{3-d}$ (M=Sr, Ca, Ba; $x=0.05-0.6$; and $y=0.2-0.6$) and its use in forming syn-gas (Title, Abstract; P-0006, 0010, 0014). The mixed valence state of Element-B in the instant claim-1, Formula-1 and claim-42 is anticipated over the substitution of Sr^{2+} by La^{3+} at A-site of the perovskite and the electroneutrality of the oxide. The occupation of Ga in a portion of A-site of the perovskite is anticipated over cation distribution and ionic sizes of elements.

Ishihara further teaches forming the composite oxide by heating precursor mixture and sintering it (P-0019; 0025-0027). The mixing and heat treating of the components in air per claim 49 is anticipated over the stable oxide formation from its precursors and that further meets the carrying out step a under controlled oxygen partial pressure in claim-46. All the limitations of the instant claims are met.

The reference is anticipatory.

In the alternative that the disclosure by Ishihara et al be insufficient to anticipate the instant claims, the instant claimed composition and the method steps nonetheless would have been obvious to a person of ordinary skilled in the art over the disclosure because the reference teaches each of the claimed ingredients within the composition and a method of making it, The burden is upon the applicant to prove otherwise. In re Fitzgerald, 619 F.2d 67, 205 USPQ594 (CCPA 1980).

8. Claim 45 is rejected under U.S.C. 103(a) as obvious over Ishihara et al (JP 2001-093325).

The composition, method of making the composition, and its performance in O_2 transport by Ishihara as set for in rejection-7 is herein incorporated.

The prior art fails to teach the composite with the instant claimed elemental ratios..

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It would have been obvious to a person of ordinary skilled in the art to make instant claimed composite with predictable results and reasonable expectation of success, because prior art component ratios lie close to the instant claimed value, and, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KALLAMBELLA VIJAYAKUMAR whose telephone number is (571)272-1324. The examiner can normally be reached on M-F 07-3.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 5712721358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KMV/

Feb 05, 2009.

/Stanley Silverman/

Supervisory Patent Examiner, Art Unit 1793